

THE CONSTRUCTION OF A KNOWLEDGE BASE ON HIGHER EDUCATION FEDERALISM IN GERMANY

Peer Pasternack,

*Institute for Higher Education Research,
Martin Luther University Halle Wittenberg,*

Robert D. Reisz,

*Faculty of Mathematics and Computer Science,
West University, Timisoara*

Abstract. The present paper refers to a long-term project of the Institute for Higher Education Research of the Martin Luther University Halle Wittenberg financed by the German Federal Ministry for Education and Research. The goal of this project is to determine the quality effects of the German federalism reform on higher education. We will introduce the basic facts on the German federalism reform in higher education and discuss the outline of the concept of statistical monitoring. While following the statistical development of a higher education system to enhance knowledge for policy decisions is also covered by other institutions, the particularity of our project is the elaborate statistical methodology that intends to sort out the causal links between federal differentiation and higher education development in the German lands. We will introduce these methods shortly in the paper and discuss the data collected as well as the levels of analysis. As the project is still in an early phase we will concentrate on introducing the design.

Key-words: higher education; German federalism reform; statistical methodology; federal differentiation.

We introduce here a statistical monitoring system conducted by the Institute for Higher Education Research of the Martin Luther University in Germany. This knowledge base is developed on a contract with the German Federal Ministry for Education and Research. For now the contract spans from 2008 to 2010. We intend to present the basic facts on the German federalism reform in higher education and discuss the outline of the concept of statistical monitoring, the methods and the data collected as

well as the levels of analysis. According to our opinion such long duration research projects are essential in giving policy decisions a well-informed framework.

The background for the statistical monitoring system of quality effects is the federalism reform in German higher education. "Higher education federalism" is no new phenomenon in Germany. Differences between the German lands in the way higher education was organized and functioned have always existed. Nevertheless, up to now, these were embedded in a tight net of horizontal bonds – between lands – and vertical bonds – between the federal government and the lands. On a horizontal level, for a long time, the movement was from a pure to a cooperative cultural federalism (Peisert/Framheim 1990: 7). On a vertical level, a form of "condominium" of the government of higher education developed between the federal government and the lands (Thieme 1986: 138).

The German federalism reform has come into effect in September 2006 and is the most comprehensive change in the constitution of Federal Germany since its existence. Its major effect is the change of relation between the federation and the lands in respect to legislation (Bundesgesetzblatt, 2006).

The federalism reform influences higher education as well. Education policy becomes exclusive matter of the lands. This reinstates a distribution of decision making power that has existed previously to the reforms of the mid 1960s even if the reasons for more federal involvement in higher education policy (the expansion of the sector, the national relevance of higher education, etc.) did not cease to exist. After the new federalism reform, competences of the federation in higher education remain the general regulation of higher education access and degrees, from which the lands can nevertheless deviate to some degree (Bundesgesetzblatt, 2006). Previous federal tasks of higher education development and education planning become now autonomous functions of the lands. This implies that the federation will not fund higher education development and will not be able to grant any form of direct financial support to education institutions up to few constitutionally defined exceptions (like the Excellence Initiative, the Higher Education Pact 2020 or the mixed federal and land financing of the DFG – German Science Foundation).

These changes will effect strongly on the overall German higher education area and will enable a stronger differentiation between the

German lands. The monitoring system that we will introduce in this paper intends to find the quality differences that the federalism reform produces in German higher education. The monitoring takes into consideration that higher education policy is organized in Germany on three levels: (a) the decision making area of the individual lands for the containment and development of higher education institutions, (b) the coordination of the German lands for higher education policy and (c) in very clearly defined and limited areas, the cooperation between federation and lands. The federalism reform has strengthened the first of these levels and drastically limited the scope of the third. As important differences between German lands have always existed it is the role of our monitoring system to find the way this develop and what new differences emerge in the new context .

The monitoring system

The monitoring intends to collect an important amount of data to enable an analysis of before / after quality effects of monitoring. The monitoring will have as such to collect both quantitative and qualitative data. Both of these have to have a land-comparative potential to be useful in the context of the analysis of the federalism reform.

The monitoring has three major goals:

- (a) Land-comparative analysis of basis data.
- (b) Land-comparative aggregation of information, that can indicate quality effects of the federal differentiation.
- (c) Identification of variables that explain these effects.

The monitoring will take place in three waves: the research project will start with an initial collection of data intending to be an inventory of available data, the most recent information being from 2006. A provisional final collection will take place in 2010. We are hoping that these data collections will enable the identification of the first before / after effects of the federalism reform.

The methodological construction of the monitoring relies on secondary analytical data collection:

- The evaluation of data sets previously collected, available documents and research results that fit our research question, if quality effects of the federal differentiation can be recognized.
- The major sources will be the data collection of Federal Office for Statistics, the HIS (Higher Education Information System)

comparisons of endowment, the costs and benefits comparisons, rankings (e.g. those of the DFG – German Research Foundation, the CHE – Centre for Higher Education Development, as well as rankings conducted by other organisations and interest groups), official governmental reports (especially the federal report on research, the federal report of technological performance and the federal report on education), evaluations of the federal Research Council, as well as other reports and research literature.

The monitoring will be characterised by four aspects:

1. it will concentrate on the changes in time.
2. quantitative data will be collected in absolute as well as relative form (e.g. relative to pro capita population and economical output of the lands)
3. as far as possible, next to the so-called hard data (like statistics) soft data, like opinion poll results will also be collected.
4. all developments will also be analysed in their gender particularities.

The result of the monitoring is not intended to be a simple data collection. We wish to be able to find variables that have an explanatory character, and to detect variables that are independent of the identified federal differentiations. The development and testing of an evaluation model is as such part of the here formulated research program.

The monitoring of the effects of federal differentiation offers a number of quantitative variables that enables a statistical analysis of their interaction. As most of the independent variables are categorical, we will concentrate on non-parametric tests in order to decide which variables are relevantly influenced by which characteristics of the federal structure. The results will enable decisions on the dependence or independence of quality indicators on certain federal differences. The statistical literature uses for such test the Mann-Whitney and Kruskal-Wallis tests as well as the classical Chi² test. All these tests intend to refute independence hypotheses.

The data produced by the monitoring will have a time-series character. This opens the possibility for further analysis. First of all a before – after analysis done with the Wilcoxon test becomes possible. Such evaluation will enable to decide if the structural changes had relevant effects in the given time span. As data is collected for a full set of investigation units, a cross-section time-series (CSTS) panel data set can be constructed. This can

be analysed best with fixed-effects panel regression models. Depending on the form of the data other methods can also be applied, as e.g. the PCSE (panel corrected standard errors) and the FGLS (feasible generalised least squares) methods. All these methods test effects of independent variables on a dependent variable, also taking into consideration heterogeneities of structure and time.

The aggregation level of the higher education federalism monitoring will be the level of the federal land. Groups of disciplines and type of higher education institution will be taken into consideration if these can have a theoretical influence on the individual research question.

The content of the monitoring

Content-wise, the monitoring will concentrate on four theme groups:

- education
- research
- academic personnel structure
- higher education government.

The gender aspect will be a cross-sectional theme, taken into consideration in all issues.

The data collection will differentiate between central data (that will be collected in all cases), secondary data (the collection of which will depend on time and budget restrictions) and peripheral data (that will be collected only if during the research activity the need for these information is strengthened).

The content of the monitoring will be structured as follows:

1. Socio-economical development data.
 - 1.1. Demographical development
 - 1.1.1. Population
 - 1.1.2. Occupied population
 - 1.1.3. Birth rates
 - 1.1.4. In- and Outgoing migration
 - 1.1.5. 19-year cohort size
 - 1.2. Economical performance
 - 1.2.1. GDP
 - 1.2.2. Tax collected
 - 1.2.3. Unemployment
2. Higher education legislation and reform

3. Structure of the higher education systems of the lands
 - 3.1. Numbers of institutions, according to type
 - 3.2. New foundations of institutions
 - 3.3. Expenses of the higher education institutions
 - 3.4. Incomes of the higher education institutions
 - 3.5. Investments
 - 3.6. Numbers of students, first-year students and graduates, according to type of institution and disciplines
 - 3.7. Education costs per capita
 - 3.8. Numbers of teaching staff according to type of institution and disciplines
 - 3.9. Student / staff ratios according to type of institution and disciplines
 - 3.10. Information on research and publications
4. Universities
 - 4.1. Endowment
 - 4.2. Disciplinary profiles in research and education
 - 4.3. Education supply and demand
 - 4.4. Performance and reputation
 - 4.5. International awareness and internationality
5. Fachhochschulen (universities of applied science)
 - 5.1. Endowment
 - 5.2. Disciplinary profiles in research & development and education
 - 5.3. Education supply and demand
 - 5.4. Performance and reputation

All information will be inputted in a data base that will enable a convenient administration of data and easy analytical and transactional access. The data base design will offer concurrent access to all the members of the monitoring team. This will enable a wide variety of future analyses.

The statistical analysis

As we have seen, the primary goal of the analysis is the identification of the quality effects of federal structure in German higher education. In order to answer to such questions statistical models will be developed.

In order to develop such models, indicators have to be identified that are fit to represent quality effects. These indicators will represent the dependent variables of the statistical models. We do not consider that these

indicators have to be “quality indicators” per se. It will be more the case that the change of these indicators can be interpreted as a quality effect, even if it might not be easy to decide if a specific change an improvement of quality is or not. So, for example, the number of graduates is not necessarily a quality indicator in itself, the change in number of graduates under specific conditions, as changed or unchanged financing can nevertheless be understood as a quality effect.

After the identification of these dependent variables, indicators have to be identified that aptly model the federal differences between lands. These variables will represent the most important structural variables. Such variables might span from the nominal variable “federal land” to different categories and scales that enable the grouping of federal lands. Such categories will emerge, on the one hand, from the research of higher education legislation (variables from group 2.). On the other hand, socio-economical data (group 1.) as well as data of the higher education systems of the land (group 3.) might also qualify for grouping lands. The effects of such categorical variables on the dependent variables will be tested, as already mentioned, by non-parametric tests as well.

Other, quantitative, independent variables will also be included in the models. These can be related to the dependent variables with or without taking into consideration of the federal structure. Such model calculations will enable us to find is the relationship between variables (e.g. the duration of higher education studies related to “Abitur” grades) depends or not on federal differentiations. Obviously, such equations can model complex causal structures, such that conclusions will only emerge from different model calculations.

The three types of variables, dependent, structural and independent, will be included in the CSTS regression models. To reach statistically relevant results different tests and models will be computed. The models will include first of all simple and multiple linear (pooled) regression and fixed effects FE panel regression. The tests will concentrate on the previously mentioned non-parametric tests. In the next section of this paper we will present the outline of a possible statistical analysis, for which the monitoring will make data available.

As mentioned, the construction of a statistical model starts with the identification of a dependent variable. Let us consider, for example the number of Ph.D.-s granted per professor. This indicator is computed on the

basis of the data offered by the Federal Agency for Statistics. The information is available for each federal land, for each group of disciplines and different years. We will start with an exploratory statistical analysis in order to find if the differences between federal lands are relevant. This will be made by testing the influence of the nominal variable "federal land" on the dependent, by using the Kruskal-Wallis test. We will be able to decide if the differences in values of the variable "the number of Ph.D.-s granted per professor" are explainable by the fact that these originate from different federal states. The influence of the nominal variable "discipline group" will also have to be taken into consideration. As the number of data points is relatively small, for further analysis the federal lands will be grouped in categories. One way of doing this would be by using the variable "higher education governance mode". This will lead to the construction of a smaller number of categories and a new Kruskal-Wallis test. We will follow by trying to determine which variables influence "the number of Ph.D.-s granted per professor" and if these have different ways of impacting on the dependent for different higher education governance modes. Such an analysis can be made on the basis of regression models. We will use categorical regression with optimal scaling in order to introduce in the model variables with different scales. We will compute models in order to determine first which independent variables have the largest impact on our dependent. We will use such variables like number of students, number of Ph.D. students, number of professors, and student – professor ratio as well as others. For each of these models we will compute first the model form including only rational variables and afterwards the model including the structural variable "higher education governance mode". A comparison of the results of these two model forms will determine if the structural variable impacts on the regression relationship between dependent and independent variables. A comparative analysis of the determination coefficients, as well as the standardized (beta) coefficients of the models and different forms of partial models will inform on the importance of the variable "higher education governance mode" and the way it impacts.

Such analysis procedures can evaluate the effect of a structure variable on a dependent quality variable. The monitoring concept will enable calculations as the one presented above that can represent a basis for better informed policy decisions in the area of higher education quality management.

Conclusions

The monitoring system of the quality effects resulting from of federalism reform in Germany had to solve one basic issue that has a scientific relevance. The data collection and construction of the data base would be less useful if the perceived changes of the collected indicators would not be relatable to the federalism reforms. The statistical methodology introduced above intends to find a way to solve this.

We have intended to present the monitoring system to an international audience not only in order to disseminate our work. Even more importantly, we find that an exchange of ideas on the use and design of such systems would be beneficial for the improvement of data collection and analysis tools that are intent to improve the information basis for policy decisions on higher education quality.

REFERENCES

- Bundesgesetzblatt (2006), *Gesetz zur Änderung des Grundgesetzes (Artikel 22, 23, 33, 52, 72, 73, 74, 74a, 75, 84, 85, 87c, 91a, 91b, 93, 98, 104a, 104b, 105, 107, 109, 125a, 125b, 125c, 143c)*, Bundesgesetzblatt Jahrgang 2006, Teil I, Nr. 41, Bonn / 31. August.2006.
- Peisert, H. and Framhein, G. (1990), *Das Hochschulsystem in der Bundesrepublik Deutschland. Struktur und Entwicklungstendenzen*, Bundesminister für Bildung und Wissenschaft, Bock Verlag, Bad Honnef.
- Thieme, W. (1986), *Deutsches Hochschulrecht. Das Recht der wissenschaftlichen, künstlerischen, Gesamt- und Fachhochschulen in der Bundesrepublik Deutschland*, Carl Heymanns Verlag, Köln.

BABEŞ-BOLYAI UNIVERSITY
CENTRE FOR UNIVERSITY DEVELOPMENT

*Journal of University Development
and Academic Management*

CLUJ UNIVERSITY PRESS

2008

Journal of University Development and Academic Management

Year V, No. 9-10, 2008

Journal of University Development and Academic Management

Edited by: Centre for University Development

Editorial Board: Carmen Loredana Pop

Camelia Moraru

Dana Opre

Gelu Gherghin

Monica Zaharie

Typing: Romana Cucuruzan, Camelia Moraru

Referees: Andrei Marga

Jan Sadlak

Panaite Nica

Paul Șerban Agachi

Constantin Brătianu

Adrian Curaj

Babeș-Bolyai University

Centre for University Development

7 Pandurilor Street

Juventus Building

Phone: +40-264-429788, +40-264-405300

Cluj-Napoca, Romania

Fax: +40-264-429793

cdu@staff.ubbcluj.ro

<http://www.ubbcluj.ro>

© 2008 All rights reserved.

**Autors are responsible for the opinions expressed therein,
which are not necessarily those of B.B.U. or the editors.**

Babeș-Bolyai University

Cluj University Press

Director: Codruța Săcelean

51 Hasdeu Street

400371, Cluj-Napoca, Romania

Phone/Fax: +40-264-597401

presa_universitara@easynet.ro

<http://www.editura.ubbcluj.ro>

ISSN 1584-8264

SUMMARY

HIGHER EDUCATION: AN EMERGING FIELD OF RESEARCH AND POLICY

Philip G. Altbach 7

A RESEARCH AGENDA ON GLOBALISATION AND INTERNATIONALISATION IN HIGHER EDUCATION

Hans de Wit..... 41

MANAGEMENT, STRATEGIC PLANNING AND VISION. PRACTICAL ASPECTS

Andrei Marga..... 49

HOW MEDIA REFLECT AND AFFECT DEVELOPMENTS IN HIGHER EDUCATION

Ursula Mommsen-Henneberger 61

THE CONSTRUCTION OF A KNOWLEDGE BASE ON HIGHER EDUCATION FEDERALISM IN GERMANY

Peer Pasternack, Robert D. Reisz 69

CONTENTS OF "THE UNIVERSITY RANKING" OF ASAHI SHIMBUN PUBLICATIONS INC

Testuo Kobayashi 79

THE CHANGING ROLE OF THE UNIVERSITY AND THE EMERGENCE OF QUALITY ASSURANCE IN JAPAN: THE MEANINGS OF 'CULTURAL MISSION' IN ITS REFORM

Naoko Suzuki 95

FORMALISING THE CULTURAL MISSION OF THE UNIVERSITY

Ludvik Toplak..... 109

THE UNIVERSITY OF THE 21ST CENTURY. CHALLENGES

Andrei Marga117